Of several mental foramina, the largest one is situated below the position of the first premolar.

The condyle holds the same relative height as in Cats. The back portion of the jaw, including the coronoid process, is proportionately not so broad as in the latter. The masseteric fossa is shallower at its lower part, and is not bounded by the everted base, but is defined a little above the latter in a curvature sweeping from the condyle downward and forward to an angle about halfway below the position of the last molar tooth.

The molar teeth, of which there were five, completely occupied the space back of the canine, as in some of the viverrine and musteline animals, there being no hiatus in the series. All the molars were double-fanged, and none appear to have been of the tubercular kind.

The first premolar was the smallest, and the third premolar appears to have been the largest tooth of the molar series. The fourth premolar was intermediate in size to the third and the last molar, which appears to have but little exceeded this and the second premolar.

The remains of the crown of the last molar indicate a bilobed tooth, apparently like the sectorial molar of Felis, and without a heel. The crown of the tooth in advance was provided with a well-developed heel, but the fore part is too much broken to ascertain its form. The larger tooth in advance, the third premolar, retains its heel, which has a subtrenchant fore and aft border, and is bounded internally and externally by an oblique basal ridge.

For the animal indicated by the fossil jaw, the name of *Patriofelis ulta* is proposed. The measurements of the specimen are as follow:

| | |
|---|---|
| Estimated length of lower jaw when complete | 6 inches. |
| Breadth of coronoid process at base | $1\frac{3}{4}$ " |
| Height at condyle, and below last molar tooth | $1\frac{5}{8}$ " |
| Height below first premolar | $1\frac{1}{2}$ " |
| Length of molar series | 3 " |

Breadth of crown of first molar tooth, $4\frac{1}{2}$ lines; second do., 8 lines; third do., 9 lines; fourth do., $7\frac{3}{4}$ lines; fifth do., 8 lines.

PROF. MARSH exhibited specimens of the remains of a bird allied to the Turkey, which he considered as belonging to an extinct species. These remains were said to have been found in the green sand of Monmouth Co., N. J., but doubtless were from the post-tertiary above it. He proposed to name the species *Meleagris altus*.

Prof. Marsh also called attention to the tooth of a Peccary from the miocene of Shark River, New Jersey. It is a second molar from the left side of the lower jaw. He proposes to call the species to which it belonged *Dicotyles antiquus*.

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*March 15th.*

The President, DR. RUSCHENBERGER, in the Chair.

Twenty members present.

The following paper was presented for publication:

"Cross Fertilization and Law of Sex in Euphorbia." By Thomas Meehan.

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*March 22d.*

DR CARSON, Vice-President, in the Chair.

Thirty-six members present.

The following paper was presented for publication:

"Descriptions of Fossils collected during the U. S. Geol. Survey under the charge of Clarence King." By F. B. Meek.

PROF. LEIDY exhibited specimens of ichthyodorulites, upon which he made the following remarks:

XIPHACTINUS AUDAX. The genus and species are founded on an interesting specimen belonging to the collection of the Smithsonian Institution, and obtained from the cretaceous formation of Kansas by Dr. Sternberg. From the want of symmetry in the base of the specimen, I suppose it to have been the pectoral spine of some huge siluroid fish.

It is a broad sabre-shaped weapon, in its present condition sixteen inches long, which is near its original length, if one may judge from the thinness and rounding of the border at the broken end. At its middle it is nearly two inches broad and almost seven and a half lines thick. It slightly narrows and becomes thinner towards the outer end, and becomes thicker and more narrow approaching the base. An inch and a half from the latter it is thirteen and a half lines thick and seventeen lines wide; and the same distance from the outer end it is the fourth of an inch thick and twenty lines wide. The anterior convex border is rounded at first, but becomes subacute at its outer part. The posterior concave border is rather more obtuse.

A large groove commences back of the root, extending outwardly, becoming contracted and deeper, and opening to its bottom along the under part of the spine to its outer extremity. The bottom of the groove is irregularly pitted, and its upper surface formed by the overhanging posterior portion of the spine is transversely corrugated or striated. A similar but shallower groove commences in front of the root, and extending outwardly opens beneath the spine at the anterior half of its surface.

The upper surface of the spine is nearly flat and longitudinally striated, except at the outer part of the anterior border, where the striation is finer and curves forward.

The root of the spine turns up into a sort of hook-like process, broken at the end. It has been about two and a half inches in height from a level with the inferior surface of the spine. The inner part of the root forms a vertical oblong convexity, the lower half of which is occupied by a raised facet, apparently an articular surface, upon which the spine moved.

Prof. Agassiz, in his Poissons Fossiles, has described specimens of ichthyodorulites from the chalk of Lewes, England, which he referred to placoid fishes of the genus *Ptychodus*, "from the circumstance of their constant occurrence in the same localities" as teeth upon which the genus was first established. These rays are especially remarkable for their segmented character. "Instead of being composed of a single piece, as in other genera, they consist of flat rods, or rather broad, thick plates intimately united, but rendered distinct on the surface of the ray by longitudinal grooves." Without question as to the reference of these rays, I exhibit several similar specimens from the cretaceous formation of Kansas, submitted to my examination by the Smithsonian Institution. The same collection of fossils, of which the rays were part, also contained many teeth of *Ptychodus Mortoni*, but I am uninformed whether they were found in association.

The specimens are probably two fragments of the same ray, but an intermediate piece is wanting, and they are imperfect at the opposite ends. They also appear to be somewhat compressed from pressure. As a whole the ray is flat at the sides, with a thickened, convex, posterior border, and an acute dentated or festooned anterior border. The dentate processes are composed of a denser tissue than the rest of the ray, and are thickened in a line from the point to the base. The body of the ray is composed of longitudinally oblique bars ascending from the posterior border to the bases of the dentate processes in which they are merged. The longer and broader fragment is four and three-

quarter inches long and three-quarters of an inch wide, gradually tapering to seven lines, and is provided with about seven and a half dentate processes. The other fragment is three and three-quarter inches long, seven lines wide below, and four lines at the broken apex, and is provided with nine dentate processes.

The segmented condition of the ray recalls to mind a singular fossil specimen formerly described by me as the portion of a jaw of a fish to which the name of *Edestus vorax* (Jour. Acad. Nat. Sci. iii, 159, pl. 15) was given, and which also exhibits a segmented condition. This fossil, notwithstanding its jaw-like appearance furnished with shark-like teeth, I have always suspected was an ichthyodorulite (Proc. 1856, 301), and this suspicion is increased by an examination of the rays supposed to pertain to *Ptychodus*.

ASTERACANTHUS SIDERIUS. The species is founded on a fragment of an ichthyodorulite, found on a stream near Glasgow, Tennessee. The specimen was submitted to my examination by Prof. J. M. Safford, through Prof. Hayden. It purports to be of subcarboniferous age, but perhaps this is an error, for all the previous known fossils attributed to the genus are of much later age. It looks as if in its complete condition it had approximated in size the dorsal spine of *Asteracanthus ornatissimus*, which is a foot and a half long. The fragment is from an intermediate position at the junction of the root and shaft, and is a little over three inches in length. Broken at the extremities, and posteriorly, so as to leave no remains of a groove, it is composed of solid porous bone, and is triangular in transverse section. The triangle of the shaft has a base seven lines thick; the sides are about three-fourths of an inch wide, and the apex is rounded. The root is compressed laterally to a greater degree than the bottom of the shaft, and in the fragment is an inch and a half wide.

The lateral surfaces of the shaft are closely covered with large mammillary tubercles, which have been worn off at the summits. These tubercles are of enamel-like hardness, brown and lustrous. Their sides are closely and longitudinally wrinkled; the fewer wrinkles near the apex becoming branched and more numerous approaching the base. The tubercles are situated in parallel longitudinal rows, having a slight obliquity. The intervals formed by the divergence of the longer rows near the root are occupied by shorter rows. About thirteen rows, including the short ones, may be counted on one side of the specimen at the verge of the root.

PROF. LEIDY further observed that the two fossils presented this evening by Henry Green, of Elizabeth, Jo Daviess Co., Illinois, through Dr. Edward D. Kittoe, of Galena, were of considerable interest. They consist of a metacarpal bone of the Giant Sloth of Jefferson (*Megalonyx Jeffersoni*), and a last lower grinder of the extinct Ox, *Bison antiquus*. They were discovered, in the search for lead, in a narrow crevice of the lead-bearing rocks, at the depth of 130 feet, in the vicinity of Galena. A number of other bones were found at the same time, but, unfortunately for the interests of science, these are scattered or lost.

The museum of the Academy contains fossils which were found in a similar position in the same locality some years back. Of these, some were presented by Dr. LeConte, who obtained them from Mr. Snyder of Galena; others were presented by my friend Dr. Kittoe. They consist of remains of an extinct Peccary, *Platygonus compressus*, larger than the existing species; an extinct Raccoon, *Procyon priscus*, and a large insectivore, named in honor of Mr. Snyder, *Anomodon Snyderi*. These animals were probably cotemporaries of the former.

MR. THOMAS MEEHAN said that no one who examined the prevailing theories concerning the formation of bark and wood with numerous living specimens before him, could be satisfied that these theories were in all respects correct. He had made numerous observations during the past year, which satisfied him that at any rate we had much to learn. He hoped to present these observa-

tions to the members at some future time, but at present wished only to direct their attention to a portion of a trunk of *Yucca alæfolia*, which he exhibited, the structure of which he suggested could not be accounted for on any theory generally known. The general idea was that the sap of plants ascended through the system, and was *elaborated* in the leaves, where the woody matter was formed, and afterwards *descended*,—in exogenous plants forming a regular concentric layer over the last year's wood, and in endogenous structures returning by the interior, pushing these descending columns of wood through the mass of cellular matter without order or system.

It would be seen that in this endogenous *Yucca* the woody matter, if it ever *descended* at all, as our present belief demanded it should do, had descended in a very regular and beautiful manner, quite as systematic, in fact, as most exogens would do. The wood was arranged in annual rings, not entirely concentric; but some tropical exogens did not have the woody annual layers always forming an entire circle any more than in this. In this case the annual layers of wood extended about two-thirds of the distance round the axis, and such layer was about the eighth of an inch thick. These annual layers were made visible by the bundles of fibres being packed more closely together towards the end of the season's growth, just as they are in exogens, from which, indeed, there was very little to distinguish this structure on a cursory examination but the absence of the so-called medullary rays.

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*March 29th.*

The President, DR. RUSCHENBERGER, in the Chair.

Thirty members present.

A resolution to amend Art. XI, Chapter 10 of the By-Laws by the omission of the word "gratuitous," was adopted after a third reading.

The following gentlemen were elected members:

Geo. Hewston, W. H. Eisenbrey and Alfred Tucker.

On favorable report of the committees the following papers were ordered to be published:

### Cross fertilization and the law of sex in EUPHORBIA.

BY THOMAS MEEHAN.

Mr. Charles Darwin's interesting observations on cross fertilization have opened a new world for original discovery. The list of plants which seem to avoid self fertilization is already very large. I think *Euphorbia* may be added to the number. Certainly this is the case with *Euphorbia fulgens*, Karw. (*E. jacquinaflora*, Hook.) which I have watched very closely in my greenhouse this winter. Several days before the stamens burst through the involucre, which closely invests them, the pistil with its ovarium on the long pedicel has protruded itself beyond, exposed its stigmatic surfaces, and received the pollen from the neighboring flowers. The way in which the pollen scatters itself is curious. In most flowers a slight jar or a breath of wind will waft the pollen to the stigmas, but I have not been able to notice any to leave the flowers in this way; for as soon as the anther cells burst the whole stamen falls from its filament like pedicel and either drops at once on the pistils of other flowers or scatters its pollen grains by the force of the fall.

This *Euphorbia* also furnishes another contribution to the theory of sex which I have advanced. The plan on which the male and female organs are formed is evidently a common one; and the only reason why some flower